CLAIMS

1. A method of producing green light signals, comprising coupling pump signals from at least one pump source into at least one erbium doped fibre (EDF) which cause ground state absorption (GSA), and excited state absorption (ESA) in erbium ions of the EDF, which produces green light signals, wherein the majority of the pump signals have a wavelength at which the probability of occurrence of ESA in the EDF is greater than the probability of occurrence of GSA in the EDF.

2. A method of producing green light signals according to claim 1, in which 60% of the pump signals have a wavelength at which the probability of occurrence of ESA in the EDF is greater than the probability of occurrence of GSA in the EDF.

3. A method of producing green light signals according to claim 1 or claim 2, in which the majority of the pump signals have a wavelength in the range approximately 920nm to approximately 980nm.

4. A method of producing green light signals according to claim 3, in which the majority of the pump signals have a wavelength in the region of 960nm.

5. A method of producing green light signals according to any preceding claim, in which the majority of the pump signals have a wavelength less than the

crossover wavelength of an EDF GSA and ESA cross section peaks crossover point.

6. A method of producing green light signals according to any preceding claim, in which a pump source is coupled to an EDF such that the pump signals are coupled into the EDF to propagate therealong in a first direction.

7. A method of producing green light signals according to claim 6, in which a pump source is coupled to an EDF such that the pump signals are coupled into the EDF to propagate therealong in a second direction, opposite to the first direction.

8. A method of producing green light signals according to any preceding claim, comprising reflecting at least some pump signals escaping from the or each or some of the EDFs back into the EDF.

9. A method of producing green light signals according to claim 8, in which reflecting the pump signals comprises placing a pump signal reflector at a first end of the or each or some of the EDFs, and/or placing a pump signal reflector at a second end of the or each or some of the EDFs.

10. A device for producing green light signals, comprising
at least one erbium doped fibre (EDF), coupled to at least one pump source to receive pump signals therefrom, which cause ground state absorption (GSA),

and excited state absorption (ESA) in erbium ions of the EDF, which produces green light signals,

the majority of which pump signals have a wavelength at which the probability of occurrence of ESA in the EDF is greater than the probability of occurrence of GSA in the EDF.

11. A method of amplification of traffic-carrying signals in an erbium doped fibre amplifier (EDFA), comprising,

pumping the EDFA with green light signals produced by the method according to any of claims 1 to 9.

12. A method of amplification according to claim 11, in which the green light signals are produced substantially externally to the EDFA, and are coupled into the EDFA.

13. A method of amplification according to claim 12, in which the green light signals are produced using one or more devices according to claim 10, coupled to the EDFA.

14. A method of amplification according to claim 13, in which a device is coupled to a first end of the EDFA, and/or a device is coupled to a second end of the EDFA.

15. A method of amplification according to claim 13, in which the EDFA comprises one or more EDFs, and one or more devices are coupled to the or each or some of the EDFs.

16. A method of amplification according to claim 15, in which a co-directional device is coupled to an EDF, i.e. green light signals are coupled into the EDF to propagate therealong in the same direction as the traffic-carrying signals.

17. A method of amplification according to claim 15 or claim 16, in which a counter-directional device is coupled to an EDF, i.e. green light signals are coupled into the EDF to propagate therealong in the opposite direction as the traffic-carrying signals.

18. A method of amplification according to claim 16, in which the green light signals are produced substantially within the EDFA.

19. A method of amplification according to claim 18, in which the green light signals are produced substantially within the EDFA by pumping the EDFA with one or more pump sources coupled to the EDFA, in which the majority of the pump signals have a wavelength at which the probability of occurrence of ESA in the EDFA is greater than the probability of occurrence of GSA in the EDFA.

20. A method of amplification according to claim 19, in which 60% of the pump signals have a wavelength at which the probability of occurrence of ESA in the EDFA is greater than the probability of occurrence of GSA in the EDFA.

21. A method of amplification according to claim 19 or claim 20, in which the majority of the pump signals have a wavelength in the range approximately 920nm to approximately 980nm.

22. A method of amplification according to claim 21, in which the majority of the pump signals have a wavelength in the region of 960nm.

23. A method of amplification according to any of claims of 19 to 22, in which a pump source is coupled to a first end of the EDFA, and/or a pump source is coupled to a second end of the EDFA.

24. A method of amplification according to any of claims 19 to 23, in which the EDFA comprises one or more EDFs, and one or more pump sources are coupled to the or each or some of the EDFs.

25. A method of amplification according to claim 24, in which a co-directional pump source is coupled to an EDF, i.e. pump signals are coupled into the EDF to propagate therealong in the same direction as the traffic-carrying signals.

26. A method of amplification according to claim 24 or claim 25, in which a counter-directional pump source is coupled to an EDF, i.e. pump signals are coupled into the EDF to propagate therealong in the opposite direction as the traffic-carrying signals.

27. A method of amplification according to any of claims 11 to 26, comprising reflecting at least some pump signals escaping from the EDFA back into the EDFA.

28. A method of amplification according to claim 27, in which reflecting the pump signals comprises placing a pump signal reflector at a first end of the EDFA, and/or placing a pump signal reflector at a second end of the EDFA.

29. A method of amplification according to claim 27, in which the EDFA comprises one or more EDFs, and reflecting the pump signals comprises placing a pump signal reflector at a first end of the or each or some of the EDFs, and/or placing a pump signal reflector at a second end of the or each or some of the EDFs.

30. A method of amplification according to claim 28 or claim 29, in which the or each or some of the pump signal reflectors reflect pump signals having a wavelength in the range approximately 920nm to approximately 980nm.

31. A method of amplification according to any of claims 11 to 30, comprising reflecting at least some green light signals escaping from the EDFA back into the EDFA.

32. A method of amplification according to claim 31, in which reflecting the green light signals comprises placing a green light signal reflector at a first end of the EDFA, and/or placing a green light signal reflector at a second end of the EDFA.

33. A method of amplification according to claim 31, in which the EDFA comprises one or more EDFs, and reflecting green light signals comprises placing a green light signal reflector at a first end of the or each or some of the EDFs, and/or placing a green light signal reflector at a second end of the or each or some of the EDFs.

34. A method of amplification according to any of claims 11 to 33, comprising substantially preventing green light signals from being transmitted from the EDFA.

35. A method of amplification according to claim 34, in which preventing transmission of green light signals comprises placing a green light signal reflector at an input end of the EDFA, and/or placing a green light signal reflector at an output end of the EDFA.

36. An erbium doped fibre amplifier (EDFA) for amplifying traffic-carrying signals, which is pumped by green light signals produced by the method according to any of claims 1 to 9.

37. A laser which produces green light signals, comprising

at least one erbium doped fibre (EDF), coupled to at least one pump source to receive pump signals therefrom, which cause ground state absorption (GSA), and excited state absorption (ESA) in erbium ions of the EDF, which produces green light signals,

the majority of which pump signals have a wavelength at which the probability of occurrence of ESA in the EDF is greater than the probability of occurrence of GSA in the EDF.

38. A laser according to claim 37, in which 60% of the pump signals have a wavelength at which the probability of occurrence of ESA in the EDF is greater than the probability of occurrence of GSA in the EDF.

39. A laser according to claim 37 or claim 38, in which the majority of the pump signals have a wavelength in the range approximately 920nm to approximately 980nm.

40. A laser according to any of claim 39, in which the majority of the pump signals have a wavelength in the region of 960nm.

41. A laser according to any of claims 37 to 40, in which a pump source is coupled to an EDF such that the pump signals are coupled into the EDF to propagate therealong in the a first direction.

42. A laser according to claim 41, in which a pump source is coupled to an EDF such that the pump signals are coupled into the EDF to propagate therealong in a second direction, opposite to the first direction.

43. A laser according to any of claims 37 to 42, which is provided with means to reflect at least some pump signal escaping from the laser back into the laser.

44. A laser according to claim 43, in which a pump signal reflector is placed at a first end of the laser, and/or a pump signal reflector is placed at a second end of the laser.

45. A laser according to claim 43, which comprises one or more EDFs, and a pump signal reflector is placed at a first end of the or each or some of the EDFs, and/or a pump signal reflector is placed at a second end of the or each or some of the EDFs.

46. A laser according to any of claims 37 to 45, in which the size of the laser is in the region of 50mm x 50mm x 20mm.

47. A method of pumping an EDFA with green light signals, comprising coupling green light signals from a laser according to the fifth aspect of the invention into the EDFA.